WHAT IS CLAIMED IS:

1. A simulator having computer-aided design programs for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising;

a control system design tool which is connected to the shift controller to inputs the shift control algorithm and which outputs a hydraulic pressure supply command based on the inputted shift control algorithm;

a first simulator section which is connected to the control system design tool to inputs the hydraulic pressure supply command and which estimates an effective clutch pressure that is assumably generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model describing entire system including the transmission; and

a second simulator section which is connected to the control system design tool and the first simulator section and which determines transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges the estimated effective hydraulic pressure;

wherein the second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model.

2. A simulator according to claim 1, further including:

a host computer which designs the second model and stores data such that the second simulator section determines the transfer functions by retrieving the stored data by predetermined parameter.

3. A simulator according to claim 1, wherein the transfer functions includes a first transfer function which is corresponding to a predetermined period of time at which the output of the second model begins increasing.

4. A simulator according to claim 3, wherein the second model includes a function which generates the output when a time during which an input of the second model exceeds a predetermined value, is greater than the predetermined period of time.

5. A simulator according to claim 1, wherein the transfer functions includes a second transfer function which is multiplied to an input of the second model such that the output of the second model converges the estimated effective hydraulic pressure.

6. A simulator according to claim 2, wherein the parameter is at least one of a fluid temperature of the transmission, a rotational speed of the hydraulic actuator, the hydraulic supply command and a shift interval.

7. A simulator having computer-aided design programs for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising;

transmission characteristic analyzing means for analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm;

parameter extracting means for extracting a parameter having influence on durability of the transmission;

undesirable shift phenomenon forecasting means for conducting simulation based on the third model, while changing the parameter and forecasting occurrence of undesirable phenomenon based on behavior change of the third model; and

algorithm correcting means for correcting the shift control algorithm based on a result of forecasting and the analyzed characteristic of the transmission.

8. A simulator according to claim 7, wherein the algorithm correcting means corrects the shift control algorithm by repeating the simulation until the forecast occurrence of undesirable phenomenon disappears.

9. A simulator according to claim 7, further including:

data base which stores the behavior change of the third model when the parameter is changed.

10. A simulator according claim 7, wherein the algorithm correcting means corrects a least part of the shift control algorithm based on a result of the forecast.

11. A simulator according to claim 7, wherein the parameter is at least one of a fluid temperature of the transmission, a clearance of the hydraulic actuator, and a friction coefficient of the hydraulic actuator.

12. A simulator having computer-aided design programs for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal

combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising;

a control system design tool which is connected to the shift controller to inputs the shift control algorithm and which outputs a hydraulic pressure supply command based on the inputted shift control algorithm;

a first simulator section which is connected to the control system design tool to inputs the hydraulic pressure supply command and which estimates an effective clutch pressure that is assumably generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model describing entire system including the transmission;

a second simulator section which is connected to the control system design tool and the first simulator section and which determines transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges the estimated effective hydraulic pressure, the second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model,

wherein the second simulator section includes:

parameter extracting means for extracting a parameter having influence on durability of the transmission;

undesirable shift phenomenon forecasting means for conducting simulation based on the third model, while changing the parameter and forecasting occurrence of undesirable phenomenon based on behavior change of the third model; and

algorithm correcting means for correcting the shift control algorithm based on a result of forecasting.

13. A simulator according to claim 12, wherein the algorithm correcting means corrects the shift control algorithm by repeating the simulation until the forecast occurrence of undesirable phenomenon disappears.

14. A simulator according to claim 12, further including:

transmission characteristic analyzing means for analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm;

and the algorithm correcting means corrects the shift control algorithm based on the analyzed characteristic of the transmission.

15. A simulator according to claim 12, further including:

data base which stores the behavior change of the third model when the parameter is changed.

16. A simulator according to claim 12, wherein the algorithm correcting means corrects a least part of the shift control algorithm based on a result of the forecast.

17. A simulator according to claim 12, wherein the parameter is at least one of a fluid temperature of the transmission, a clearance of the hydraulic actuator, and a friction coefficient of the hydraulic actuator.

18. A method for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising the steps of;

(a) inputting the shift control algorithm to output a hydraulic pressure supply command based on the inputted shift control algorithm;

(b) inputting the hydraulic pressure supply command and estimating an effective clutch pressure that is assumably generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model describing entire system including the transmission; and

(c) determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges the estimated effective hydraulic pressure; and

(d) simulating and evaluating the shift control algorithm based on a third model obtained by incorporating the second model with the first model.

19. A method according to claim 18, further including the step of:

(e) designing the second model and storing data such that the transfer functions is determined by retrieving the stored data by predetermined parameter.

20. A method according to claim 18, wherein the transfer functions includes a first transfer function which is corresponding to a predetermined period of time at which the output of the second model begins increasing.

21. A method according to claim 20, wherein the second model includes a function which generates the output when a time during which an input of the second model exceeds a predetermined value, is greater than the predetermined period of time.

22. A method according to claim 18, wherein the transfer functions includes a second transfer function which is multiplied to an input of the second model such that the output of the second model converges the estimated effective hydraulic pressure.

23. A method according to claim 19, wherein the parameter is at least one of a fluid temperature of the transmission, a rotational speed of the hydraulic actuator, the hydraulic supply command and a shift interval.

24. A method for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising the steps of;

(a) analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm;

(b) extracting a parameter having influence on durability of the transmission;

(c) conducting simulation based on the third model, while changing the parameter and forecasting occurrence of undesirable phenomenon based on behavior change of the third model; and

(d) correcting the shift control algorithm based on a result of forecasting and the analyzed characteristic of the transmission.

25. A method according to claim 24, wherein the step (d) corrects the shift control algorithm by repeating the simulation until the forecast occurrence of undesirable phenomenon disappears.

26. A method according to claim 24, further including the step of:

(e) storing the behavior change of the third model when the parameter is changed.

27. A method according claim 24, wherein the step (d) corrects a least part of the shift control algorithm based on a result of the forecast.

28. A method according to claim 24, wherein the parameter is at least one of a fluid temperature of the transmission, a clearance of the hydraulic actuator, and a friction coefficient of the hydraulic actuator.

29. A method for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle and having a hydraulic actuator to transmit power generated by an internal combustion engine to drive wheels based on at least throttle opening and vehicle speed in accordance with the shift control algorithm, comprising the steps of;

(a) inputting the shift control algorithm to output a hydraulic pressure supply command based on the inputted shift control algorithm;

(b) inputting the hydraulic pressure supply command and estimating an effective clutch pressure that is assumably generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model describing entire system including the transmission; and

(c) determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges the estimated effective hydraulic pressure, and simulating and evaluating the shift control algorithm based on a third model obtained by incorporating the second model with the first model,

wherein the step (c) includes the steps of:

(d) extracting a parameter having influence on durability of the transmission;

(e) conducting simulation based on the third model, while changing the parameter and forecasting occurrence of undesirable phenomenon based on behavior change of the third model; and

(f) correcting the shift control algorithm based on a result of forecasting.

30. A method according to claim 29, wherein the step (f) corrects the shift control algorithm by repeating the simulation until the forecast occurrence of undesirable phenomenon disappears.

31. A method according to claim 29, further including the step of:

(g) analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm;

and the step (f) corrects the shift control algorithm based on the analyzed characteristic of the transmission.

32. A method according to claim 29, further including the step of:

(h) storing the behavior change of the third model when the parameter is changed.

33. A method according to claim 29, wherein the step (f) corrects a least part of the shift control algorithm based on a result of the forecast.

34. A method according to claim 29, wherein the parameter is at least one of a fluid temperature of the transmission, a clearance of the hydraulic actuator, and a friction coefficient of the hydraulic actuator.